**Pharmacology**

**Lecture 1 (Anticholinergic)**

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| Muscarinic Antagonists | Drug | Uses/Effects |
| **Natural alkaloids** | Atropine (protype) | 1. CVS: **Tachycardia**, ↓ vasodilation, ↑ AV conduction . /Toxic dose: Cutaneous vasodilatation (**atropine flush**)
2. CNS: Depressor, Antiemetic effect, Anti-parkinsonian effect . /Toxic dose: Hyperthermia, excitement, hallucination.
3. UT: Urinary retention.
4. Respiratory system: **Bronchodilator**, ↑ viscosity.
5. Eye: Mydriasis, Cycloplegia, ↑ IOP, Loss of light reflex, sandy eye.
6. Glands: ↓ Secretion → Dry mouth, sandy eye, fever.
7. GIT: **constriction**, **paralytic ileus.**

**Uses: Pre-anesthetic medication Antispasmodic.** |
| Hyoscine | Same as Atropine, only difference:* **Short** duration of action.
* **Less** CVS effects.
* **More** CNS depressant.
* **More** antiemetic (Used in **motion sickness**)
* Can produce amnesia.

**Uses: Pre-anesthetic medication, motion sickness, antispasmodic.** |
| **Synthetic atropine substitute** | Benztropine | CNS | Parkinson’s disease |
| Homatropine | Eye | Fundus examination of eye |
| Tropicamide |
| Ipratropium | RS | Asthma, COPD, (By inhalation to reduce side effects) |
| Pirenzepine | Stomach | Peptic ulcer |
| Glycopyrrolate  | GIT | Antispasmodics in hypermotility  |
| Oxybutynin  | UT | Urinary urgency, Urinary incontinence  |

**Lecture 3 (COPD)**

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| Drugs used in chronic obstructive pulmonary disease (COPD) |
| What is it:a chronic irreversible Obstruction, lung damage and inflammation of the air sacs (alveoli). | **Risk factor: Smoking** + pollution & genetic factors. | **Treatment:*** Inhaled **bronchodilators**
* Inhaled **glucocorticoids**
* Oxygen therapy
* **Antibiotics** specifically macrolides such as azithromycin to reduce the number of exacerbations.
* Lung transplantation.
 | **Inhaled bronchodilators in COPD:****Inhaled antimuscarinics*** Ipratropium & tiotropium.
* are superior to β2 agonists in COPD

**β2 agonists**these drugs can be used either alone or combined**Salbutamol** + **Ipratropium****Salmeterol** + **Tiotropium** (long acting-less dose frequency). |

**Lecture 2 (Asthma)**

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| Class | Drug | Function |
| 1) Quick relief medications: (Bronchodilators) = to relieve acute episodic attacks of asthma. |
| Short acting 2-agonists |  | epinephrineNon-selective | **Uses:** *acute anaphylaxis.* **(hypersensitivity reactions) (Drug of choice). ←** epinephrine.**ADRS:** Hyperglycemia/Not effective orally/tremor/**CNS** (tachycardia, arrhythmia, hypertension).**Contraindications**: CVS patients, diabetic patients. | **Mechanism:**Stimulate ***adenyl cyclase*** • ↑ mucus clearance.• Stabilize Mast cell. |
| isoprenaline |
| Selective | Salbutamol (albuterol) | **inhalation**, orally, **i.v.** | **Used for:** *acute attack of asthma* (**Drugs of choice**). | **Advantages:**Minimal CVS side effects, suitable for patients with CV disorders.**ADRS:** Tremors, nervousness, tolerance. Tachycardia (**Overdose**). |
| Terbutaline | **inhalation**, orally, **s.c.** |
| Muscarinic antagonistsLess effective than β2-agonists | Ipratropium | Short duration  | Given by aerosol **inhalation**.**Quaternary derivatives** of atropine (**polar**).Minimal systemic side effects.**Uses**: Main choice in **COPD**In acute severe asthma combined with β2 agonists & corticosteroids. / Never use as a rescue medication. |
| Tiotropium | Longer duration  |
| Methylxanthines | Theophylline | orally | **Mechanism:**Phosphodiestrase inhibitors.• Block adenosine receptors (A1).• Stabilize Mast cell membrane. • ↑ diaphragmatic contraction.  | **Pharmacokinetic:**Metabolized by **Cyt P450** enzymes in liver.T ½= 8 hr.**drug interactions:**(with theophylline)**Enzyme inducers:**Phenobarbitone & rifampicin ↑ Metabolism/↓T ½.**Enzyme inhibitors:**Erythromycin↓ Metabolism/↑T ½. | **Uses:**•Second line drug in asthma (theophylline).•Status asthmatics (aminophylline).**ADRS:** Low therapeutic index.**GIT:** nausea & vomiting**CVS:** hypotension, arrhythmia.**CNS:** tremors, nervousness, insomnia, convulsion (overdose) |
| aminophylline | slow infusion |
| **Pharmacologic effects:****GIT:** ↑ secretions.**Kidney:** ↑renal blood flow, weak diuretic action |
| 2) Prophylactic therapy: (Anti-inflammatory Agents) = Not effective in acute attack of asthma. |
| Glucocorticoids(Immunosuppressant effects) | **Mechanism:** Inhibition of **phospholipase A2** (Anti-inflammatory action)**Upregulate β2 receptors.** | **Uses:** Inflammatory & autoimmune disorders, Antiemetics, prophylactic medications, **Systemic corticosteroids** for Status asthmaticus (IV) | **Metabolic effects:** Hyperglycemia, Stimulation of lipolysis.↑protein catabolism, ↓protein anabolism.**Mineralocorticoid effects: hypertension**, **hypokalemia**, sodium-fluid retention.**Depression** **/ Osteoporosis.** |
| **Inhalation**: Budesonide & Fluticasone, beclomethasone. (Best choice)Orally**:** Prednisone, methyl prednisolone.Injection: Hydrocortisone, dexamethasone. | **Systemic ADRS:** Adrenal suppression. **/**Psychosis. **/**Fat distribution. **/**Growth retardation in children. **/**Cataract. **/**Susceptibility to infections. **/**Fluid retention, weight gain, hypertension. |
| Leukotrienes antagonists | zafirlukast | Selective, reversible antagonists of cysteinyl leukotriene receptors (CysLT1receptors)Are bronchodilators. / Have anti-inflammatory action. / Taken orally.**Uses:** Prophylaxis of mild to moderate asthma. / Aspirin-induced asthma. / Antigen and exercise-induced asthma. **Side effects:** Elevation of liver enzymes, headache, dyspepsia |
| montelukast |
| pranlukast |
| Mast cell stabilizers | Cromoglycate | **Side effects:** Bitter taste, minor upper R.T. irritation.**Uses:** Prophylactic therapy, allergic rhinitis, conjunctivitis. | By **inhalation** / poor oral absorption (10%) |
| Nedocromil |
| Anti-IgE monoclonal antibody | Omalizumab | A monoclonal antibody directed against human IgE – prevents IgE binding with its receptors on mast cells & basophiles. / ↓ release of allergic mediators. / Given by injection (s.c.)/ Expensive-not first line therapy. **Side effects: Bitter taste**, minor **irritation.****Used for:** moderate to severe allergic asthma which doesn’t respond to corticosteroids. |
| Long acting2-agonists |  | SalmeterolSelective | by **inhalation** | Long acting bronchodilators (12 hr).**Used for:** nocturnal asthma.Combined with: inhaled corticosteroids. | **Advantages:**Minimal CVS side effects, suitable for patients with CV disorders.**ADRS:** Tremors, nervousness, tolerance. Tachycardia (**Overdose**). |
| Formoterol |

**Lecture 4 (Anaphylaxis)**

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| Drug | Function |
| 1st line therapy |
| Adrenaline - IM or IV | A Sympathomimetic, nonselective. (DRUG OF CHOICE FOR ANAPHYLAXIS)**Contraindications**: > 40 y cardiac patient / **ADRS:** Dysrhythmias. |
| 2nd line therapy |
| CORTICOSTEROIDS (can’t be used alone, not lifesaving) |
| Hydrocortisone - IM or IV | Reverse hypotension & bronchoconstriction by decrease release of inflammatory mediators. Also decrease mucosal swelling and skin reaction.May help to limit biphasic reactions by decreasing allergic mediators. |
| H1 Blockers (can’t be used alone, not lifesaving) |
| Chlorophenamine - IM or IV | Can help to counter act histamine-mediated vasodilation & bronchoconstriction.May help to limit biphasic reactions by 🠋 more histamine release.  |
| Phenaramine - IM or IV |
| Adjuvant to 2nd line |
| Bronchodilators |
| Salbutamol - nebulizer | 2-AD agonist, short acting, rapid relief.May also inhibit airway microvascular leakage. |
| Ipratropium - nebulizer | Anticholinergic 🠊longer duration of action 🠊 🠋 secretion. Less rapid in action**.** |
| Aminophylline - IV | Treatment of anaphylaxis when inhaled Broncho-dilators are not effective & bronchospasm is persistent. **Given in hospital setting as levels of drug should be** Therapeutically Monitored **(**has narrow therapeutic index) |
| Glucagon |
| Glucagon - 1 mg IV q 5 min | for severe anaphylaxis **in patients taking b-blockers** |
| H2 Blockers(significance of them is not established , they are associated with serious adverse drug interactions) |
| Ranitidine - 50 mg IV |  |
| cimetidine | **Contraindications**: elderly, renal/hepatic failure, or if on b-blockers. |

**Lecture 5 (adrenergic drugs)**

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| Drug | Receptor | Function |
| Direct / Catecholamine / Non-selective |
| Adrenaline | $β$ *≥ α* | **Uses: 1)** Status asthmatics (S.C./Inhalation). **2)** Allergic reactions (S.C.) **3)** Cardiac arrest (IV) **4)** local hemostatic. **5)** Local anesthetics.**Administration:** parenteral & by inhalation. |
| Noradrenaline | *α >* $β\_{1}$ | Sever vasoconstriction (α1), Reflex bradycardia, 🠝 force of contraction but 🠋 H.R.**Administration:** IV**Uses: Hypertensive state**, **local hemostatic**. |
| Isoprenaline | *β > α* | **Uses:** Mainly **cardiac arrest** (Parenteral)**, acute asthma** (Inhalation) |
| Dopamine | $D\_{1}$ *>* $β\_{1}$ *>* $α\_{1}$ | Has diuretic action /**Admin.:** parentally by infusion.**Uses:** Treatment of shock. |
| Dobutamine | $β\_{1}$ *>* $β\_{2}$ *>* $α\_{1}$ | **Uses: 1)** Acute heart failure. **2)** Cardiac decompensation. / **Admin.:** IV |
| Direct / Non-ctecholamine / Selective |
| Midodrine &Phenylephrine | $$α\_{1}$$ | **Admin.:** Orally / **ADRS:** Hypertension.**Uses: 1)Hypotension**, tachycardia. **2)**Local Hemostatic. **3)**Mydriasis. **4)**Decongestant. |
| Clonidine | $$α\_{2}$$ | Is an imidazoline. **Admin.:** Orally or as patch / **Uses: Hypotension** |
| Brimonidine | $$α\_{2}$$ | Is an imidazoline. / **Uses:** Glaucoma |
| Salbutamol | $$β\_{2}$$ | **Admin.:** Orally, by inhalation or parenteral **Uses:** Asthma and COPD. |
| Terbutaline | $$β\_{2}$$ | **Uses:** Bronchodilator, **Tocolytic** |
| Ritodrine | $$β\_{2}$$ | **Admin.:** Orally, or by injection. / **Uses: Tocolytic** for premature labor |
| Indirect / Non-ctecholamine / Non-selective  |
| Amphetamine | Abused in sports. / **Admin.:** Orally. / **ADRS:** Tachyphylaxis, euphoria, weight loss. **CNS slide effects.** |
| Dual / Non-ctecholamine / Non-selective |
| Ephedrine | Abused in sports. / **Admin.:** Orally. / **ADRS:** Tachyphylaxis, urine retention. |
| Direct / Nasal & Ocular decongestant |
| Phenylephrine | **Uses:** treatment for nasal stuffiness / **ADRS:** Can cause nasal rebound. |
| Methoxamine |
| Nephazoline |
| Oxymetazoline |
|  |
| Dual / Nasal & Ocular decongestant |
| Pseudoephedrine | CNS & pressor effects compared to ephedrine / works the same as “Nasal & Ocular Decongestants” & for **flu** |

 **Lecture 6 (respiratory tract infection)**

\*Root of administration: PO = orally

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| Drug | Pharmacokinetics | Uses |  ADRS |
| Cell wall synthesis inhibitors (through inhibition of peptidoglycan layer of the cell wall.) |
| β-lactam antibiotics Penicillins (Bactericidal) |
| Amoxicillin | **Clavulanic acid** | Orally or parenterally / Not metabolized in human. /Excreted mostly unchanged in urine / Relatively polar. | **URTI’s**, **Acute otitis media** (especially produced by Group A gram + β-haemolytic streptococci).**LRTI’s.** | Hypersensitivity.Diarrhea / NephritisSuperinfections.Convulsions (after high IV dose or in renal failure). |
| Ampicillin | **Sulbactam** |
| Piperacillin | **Tazobactam** |
| β-lactam antibiotics Cephalosporins (Bactericidal) |
| Cephalexin-PO | 1st Generation / Manly against **gram + bacteria.**  | URTI’s | * Hypersensitivity reactions.
* Thrombophlebitis.
* Superinfections.
* Diarrhea.
 |
| Cefuroxime axetil-PO | 2nd Generation / mainly against **Gram - bacteria.**Active against β-lactamase –producing bacteria. | * URTI’s
* LRTI’s
* Sinusitis
* Otitis media
 |
| Cefaclor-PO |
| Ceftriaxone-IV | 3rd Generation / Manly against **Gram - bacilli.**Penetration into CSF / Excreted mostly in urineLong Half-life(4-7h) (Ceftriaxone) | **Pneumonia** produced by β-lactamase bacteria. |
| Cefotaxime-IV |
| Cefixime-PO |
| Protein synthesis inhibitors (by binding to 50S subunit of the bacterial ribosomes) |
| Macrolides Cephalosporins (Bacteriostatic) (Bactericidal at high concentration) |
| Erythromycin | --- | **Chlamydial** pneumoniaLegionella pneumonia | Hypersensitivity Reactions |
| Azithromycin | Mainly against **Gram – bacteria** / **Inactive** metabolite**No effect** on cytochrome P450 system |
| Clarithromycin | Manly against **gram + bacteria** / **Active** metabolite**Inhibits** cytochrome P450 system.  |
| DNA synthesis inhibitors (Inhibit DNA Gyrase enzyme (an enzyme involved in DNA supercoiling) ) |
| Fluoroquinolones |
| Ciprofloxacin | Given **orally** or **parenterally**. / Excreted mainly in **kidney,**Concentrates in many tissue (kidney, prostate, lung, bones)Relatively ↓ T½ allows once daily (**moxifloxacin** & **Gatifloxacin**) & twice-daily (**Ciprofloxacin**).**Antibacterial spectrum:****Ciprofloxacin** mainly effective **Gram - bacteria,****Moxifloxacin** & **Gatifloxacin** G – & G + & given once daily( highly active against Pseudomonas species ) **Contraindications:**< 18 years, Pregnancy, Breast feeding. | Acute exacerbation of **COPD**.Community acquired pneumonia.Legionella pneumonia. | Nausea, vomiting, diarrhea.**CNS effects:**(Confusion, insomnia, headache, anxiety).Arthropathy.**Phototoxicity.** |
| Moxifloxacin |
| Gatifloxacin |

**Lecture 7 (TB)**

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| Drug | Function |
| 1) First-line treatment |
|  IsoniazidTaken together with Rifampin for 9 months as treatment. | **Mech.:** 1) Bacteriostatic. 2) Bactericidal. / Inhibit synthesis of cell wall (**Mycolic acid**)**Site:** Intracellular & extracellular bacilli. / **Use:** **TB**, latent TB, **Prophylaxis** against TB.**ADRS:** Peripheral neuritis, optic neuritis & atrophy, hepatitis. / **Drug interaction:** *E. inhibition.* |
|  Rifampin | **Mech.:** 1) Bactericidal. / Inhibit **RNA synthesis**. / **Use:** Treatment & **Prophylaxis** for **TB**.**Site:** Intracellular & extracellular bacilli. / **Drug interaction:** *E. inducer.***ADRS:** 1) red-orange decolorized secretions. 2) Hepatitis. 3) Flu-like syndrome. 4) Hemolytic anemia. |
| EthambutolTaken with Pyrazinamide for the 1st 2 months to shorten the treatment from 9 to 6 months. | **Mech.:** 1) Bacteriostatic. / Inhibit mycobacterial **arabinosyl transferase** disrupting its assembly. **Site:** Intracellular & extracellular bacilli. / **Use:** **Combined** with other drugs to treatment **TB**.**ADRS:** 1) Optic neuritis. 2) Red-green color blindness. **Contraindication:** Children under 5 years. |
| Pyrazinamide | **Mech.:** 1) Bacteriostatic. / Unknown. / **ADRS:** 1) Hepatotoxicity. 2) Hyperuricemia. 3) Drug fever & Skin rash.**Site:** Intracellular bacilli. / **Use:** In **MDR-TB**. & as **Prophylaxis** & to **shorten course** of treatment **TB**. |
| Streptomycin | **Mech.:** 1) Bactericidal. / **Inhibit of protein synthesis** by binding to 30S ribosomal subunits. **Site:** Extracellular bacilli. / **Use:** **Sever life- threating** form of **TB** as **meningitis, disseminated** disease.**ADRS:** 1) Ototoxicity. 2) Nephrotoxicity. 3) Neuromuscular black. |
| 2) Second-line treatment |
| Ethionamide | **Mech.:** Inhibit synthesis of cell wall (**Mycolic acid**). / **ADRS:** 1) Teratogenic. 2) Poorly tolerated. |
| Rifabutin | **Mech.:** RNA inhibitor. Cross-resistance with Rifampin is completed. / **Drug interaction:** *E. inducer.***Site:** Intracellular & extracellular bacilli. / **Use:** Prevention & treatment of TB & **atypical** TB. **ADRS:** 1) GIT intolerance. 2) Orange-red discoloration of body secretions. |
| Para-Aminosalicylic acid (PAS) | **Mech.:** 1) Bacteriostatic. / Inhibit folic acid synthesis.**ADRS:** 1) GIT upset. 2) Crystalluria. |
| Fluoroquinolones (ciprofloxacin) | **Use:** effective against **MRTB (multidrug- resistant tuberculosis.)** |

**Lecture 8 (Antibiotic)**

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| Drug | Info. | Contra. | ADRS |
| Inhibition of cell wall synthesis |
| Penicillins | Bacterial β-lactamase inactivates it (By cleaving the β-lactam ring of the drug). |  |  |
| penicillin G | Narrow spectrum |  |  |
| Ampicillin | Broad spectrum |  |  |
| Amoxicillin | Broad spectrum |  |  |
| Cephalosporin | Bacterial β-lactamase inactivates it. |  |  |
| Inhibition of protein synthesis  |
| Macrolides |  |  |  |
| Tetracyclines |  | Pregnancy and Lactation → | Bone deformity. |
| Chloramphenicol |  | G-6-PD deficiency → | Hemolysis.**Grey baby Syndrome****Plastic anemia.** |
| Aminoglycosides |  | Pregnancy and Lactation → | Hearing loss.**renal failure** |
| Erythromycin |  |  | **hepatic failure** |
| Inhibition of DNA synthesis |
| Quinolones |  | Children & Pregnancy → | **tendon damage** |
| Inhibition of folate synthesis |
| Sulphonamides |  | G-6-PD deficiency → | Hemolysis. |
| Trimethoprim |  |  |  |
| Inhibition of RNA synthesis (by binding to RNA polymerase) |
| Rifampicin | **Use:** TB |  |  |

**Lecture 9 (rhinitis and cough)**

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| Drugs for rhinitis |
| Anti-histamines generations | **1st** | **e.g. Chlorpheniramine Diphenhydramine Promethazine (used for Nausea and vomiting)** | short duration, drug interactions, ADRs (sedation) | Clinical uses:1. Allergic rhinitis: relieves rhinorrhea, sneezing, and itching of eyes and nasal mucosa2. Common cold3. Motion sickness.4. Allergic dermatosesH1 block actions:Conjunctivitis, Urticaria, Flu (cough & sneezing)ItchingInsomnia, Sleep aid, Vertigo, Anxiety, CoughPOOR CONTROL of Asthma, Otitis, Anaphylaxis, Sinusitis, Atopic dermatitis. | Metabolized in the liverExcretion via kidneyexcept fexofenadine | ADRs:Sedation, tinnitus, fatigue, dizziness, blurred vision, dry mouth, CNS effects at overdose | Drugs interaction:Interact with CNS depressants & cholinesterase inhibitors |
| **2nd**  | **Cetirizine****Loratadine** | short duration, no drug interaction, minimal ADRs, specific for H1 receptors |
| **3rd**  | **Levocetirizine****Fexofenadine****Desoloratadine** |
| serotonin | appetite |
| α-adrenergic | HypotensionDizzinessReflex tachycardia |
| cholinergic | Dry mouthUrinary retentionSinus tachycardia |
|  |  | **Clinical use**  | **ADRs**  |
| ANTI-ALLERGICS  | **Mast cell stabilizers:****Cromolyn & Nedocromyl** | Used in children for prophylaxis of perennial allergic rhinitis.\*Should be given on a daily basis and never stop abruptly. | Induce cough, wheezes, headache, rash |
| **Leukotriene receptor Antagonists :****Zafirlukast, Montelukast, Pranlukast** | Prophylaxis of lower respiratory tract allergies | Elevation of liver enzymes, headache, dyspepsia |
|  topical Corticosteroids | **beclomethasone, budesonide, & fluticasone** | Given in severe intermittent or moderate persistent symptoms | Nasal irritation, fungal infection, hoarseness of voice |
|  Decongestants (α-Adrenergic agonists)  | **Systemic: Pseudoephedrine** | For treatment of nasal stuffiness | * Nervousness, insomnia, tremors, palpitations, hypertension.
* Better avoided in hypertension, heart failure, angina pectoris, hyperthyroidism, Glaucoma.
 |
| **Topical: Phenylethylamines & Imidazoline** | Rebound nasal stuffinessDue to repeated administration (10 days -2 weeks) |
|  Anticholinergics | **Ipratropium** | Nasal drops to control rhinorrhea.-very effective in vasomotor rhinitis (watery hyper-secretion).-bronchodilator in asthma. | wheezing, bladder pain, cough producing mucous |

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| Drugs for cough  |
| For Reproductive cough  | **Expectorants**  | Reflex stimulation (**Guaifenesin)**  | **ADRs:**Dry mouth, chapped lips, risk of kidney stones(🠉uric acid excretion). | Clinical use: Common cold, Bronchitis, Pharyngitis, Chronic paranasal sinusitis. |
| Direct stimulation ( e.g. Iodinated glycerol) | ADRs:Unpleasant metallic taste, hypersensitivity, hypothyroidism, swollen salivary glands & flare of old TB.  |
|  |  | Mechanism  | ADRs |
| Mucolytics  |  Hypertonic saline and NaHCO3 | * Viscoelasticity by

🠉 water content | Use: Most mucolytics are used as adjuvant therapy when there is excessive &/or thick mucus |
| Steam inhalation  | 🠋 Adhesiveness |
| **N-acetylcysteine**  | Breakdown S-S bonds (used in acetaminophen over dose) | Bronchospasm, stomatitis, rhinorrhea, rash, nausea & vomiting |
| **Bromhexine** and its metabolite(ambroxol)  | Synthesize serous mucus & activate ciliary clearance  | Rhinorrhea, lacrimation, gastric irritation, hypersensitivity |
| **Pulmozyme** (Dornase Alpha or rhDNAase) | Cleavage of extracellular bacterial DNA (used in severe infections) | Voice changes, pharyngitis, laryngitis, rhinitis, chest pain, fever, rash |
|  |  |  | **Drug**  | **Target**  |
| For dry cough: Antitussive agents   | Peripherally inhibitors   | Inhibitors ofAirway stretch receptor | Demulcentm coated as Lozenges & gargles | Pharynx |
| Emollients, coated by Menthol & eucalyptus | Larynx |
| aerosols or inhalational of hot steam:Eucalyptol & tincture benzoin compound | Tracheobronchial |
| Use local anesthetic aerosols: Lido*caine*, benzo*caine*& tetra*caine* | Bronchoscopy OR bronchography |
| Inhibitors of pulmonary stretch receptor in Alveoli:**Benzonatate** | Mechanism:⭣ Sensitivity (numbing) of receptors by local anesthetic action.  | ADRs: Drowsiness,Dizziness, Dysphagia allergic reactionCNS effects when overdosed  |
| Centrally  | Opioids**: Codeine** &phol**codine** |  |  |
| Non-opioids: Anti-Histamine & **Dextromethrophan** | 🠉 Threshold at cough center.**It has benefits over opioids in being:**  **1. As potent as codeine****2- But no drowsiness****3- Less constipating****4- No respiratory depression.****5- No inhibition of mucociliary clearance****6- No addiction.** | ADRs: In normal doses: NauseaVomitingDizzinessRashPruritus OVERDOSE:Opoiat-like ADRs on RT &GIT + Hallucination |

**Probably Won’t be in the exam**