Pharmacology

Lecture 1 (Anticholinergic)

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)

Drugs used in chronic obstructive pulmonary disease (COPD)

What is it:	Risk factor:	Treatment:	Inhaled bronchodilators in COPD:
a chronic irreversible Obstruction, lung damage and inflammation of the air sacs (alveoli).	**Smoking** + pollution & genetic factors.	• Inhaled **bronchodilators** • Inhaled **glucocorticoids** • Oxygen therapy • **Antibiotics** specifically macrolides such as azithromycin to reduce the number of exacerbations. • Lung transplantation.	**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)

Class		Drug	Function		
1) Quick relief medications: (Bronchodilators) = to relieve acute episodic attacks of asthma.					
Short acting β2-agonists	Non-selective	epinephrine	**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.
	Non-selective	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**).
	Selective	Terbutaline	**inhalation**, orally, **s.c.**		
Muscarinic antagonists Less 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) = <u>Not</u> effective in acute attack of asthma.					
Glucocorticoids (Immunosuppressant effects)		**Mechanism:** Inhibition of **phospholipase A2** (Anti-inflammatory action) **Upregulate β_2 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 montelukast pranlukast	Selective, reversible antagonists of cysteinyl leukotriene receptors (CysLT$_1$receptors) 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		
Mast cell stabilizers		Cromoglycate Nedocromil	**Side effects:** Bitter taste, minor upper R.T. irritation. **Uses:** Prophylactic therapy, allergic rhinitis, conjunctivitis.		By **inhalation** / poor oral absorption (10%)
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 β2-agonists	Selective	Salmeterol Formoterol	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**).

Lecture 4 (Anaphylaxis)

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.
H_1 Blockers (can't be used alone, not lifesaving)	
Chlorophenamine - IM or IV Phenaramine - IM or IV	Can help to counter act histamine-mediated vasodilation & bronchoconstriction. May help to limit biphasic reactions by ↓ more histamine release.
Adjuvant to 2nd line	
Bronchodilators	
Salbutamol - nebulizer	β_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**
H_2 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)

Drug	Receptor	Function
Direct / Catecholamine / Non-selective		
Adrenaline	$\beta \geq \alpha$	**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	$\alpha > \beta_1$	Sever vasoconstriction (α1), Reflex bradycardia, ↑ force of contraction but ↓ H.R. **Administration:** IV **Uses:** **Hypertensive state**, **local hemostatic**.
Isoprenaline	$\beta > \alpha$	**Uses:** Mainly **cardiac arrest** (Parenteral), **acute asthma** (Inhalation)
Dopamine	$D_1 > \beta_1 > \alpha_1$	Has diuretic action /**Admin.:** parentally by infusion. **Uses:** Treatment of shock.
Dobutamine	$\beta_1 > \beta_2 > \alpha_1$	**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 Methoxamine Nephazoline Oxymetazoline	**Uses:** treatment for nasal stuffiness / **ADRS:** Can cause nasal rebound.	
Dual / Nasal & Ocular decongestant		
Pseudoephedrine	CNS & pressor effects compared to ephedrine / works the same as "Nasal & Ocular Decongestants" & for **flu**	

*Root of administration: PO = orally

Lecture 6 (respiratory tract infection)

Drug	Pharmacokinetics		Uses	ADRS
Cell wall synthesis inhibitors (through inhibition of peptidoglycan layer of the cell wall.)				
β-lactam antibiotics **Penicillins (Bactericidal)**				
Amoxicillin Ampicillin Piperacillin	**Clavulanic acid** **Sulbactam** **Tazobactam**	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 / Nephritis Superinfections. Convulsions (after high IV dose or in renal failure).
β-lactam antibiotics **Cephalosporins (Bactericidal)**				
Cephalexin-PO	1st Generation / Manly against gram + bacteria.		URTI s	• Hypersensitivity reactions. • Thrombophlebitis. • Superinfections. • Diarrhea.
Cefuroxime axetil-PO Cefaclor-PO	2nd Generation / mainly against **Gram - bacteria.** Active against β-lactamase –producing bacteria.		• URTI's • LRTI's • Sinusitis • Otitis media	
Ceftriaxone-IV Cefotaxime-IV Cefixime-PO	3rd Generation / Manly against **Gram - bacilli.** Penetration into CSF / Excreted mostly in urine Long Half-life(4-7h) (Ceftriaxone)		**Pneumonia** produced by β-lactamase bacteria.	
Protein synthesis inhibitors (by binding to 50S subunit of the bacterial ribosomes)				
Macrolides Cephalosporins (Bacteriostatic) (Bactericidal at high concentration)				
Erythromycin	---		**Chlamydial** pneumonia Legionella 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 Moxifloxacin Gatifloxacin	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.**

Lecture 7 (TB)

Drug	Function
1) First-line treatment	
Isoniazid Taken 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.
Ethambutol Taken 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)

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)

Drugs for rhinitis

<table>
<tr><td rowspan="3">Anti-histamines generations</td><td>1st</td><td>e.g.
Chlorpheniramine
Diphenhydramine
Promethazine
(used for Nausea and vomiting)</td><td>short duration, drug interactions, ADRs (sedation)</td><td rowspan="3">Clinical uses:
1. Allergic rhinitis: relieves rhinorrhea, sneezing, and itching of eyes and nasal mucosa
2. Common cold
3. Motion sickness.
4. Allergic dermatoses
H1 block actions: Conjunctivitis, Urticaria, Flu (cough & sneezing)
Itching
Insomnia, Sleep aid, Vertigo, Anxiety, Cough

POOR CONTROL of Asthma, Otitis, Anaphylaxis, Sinusitis, Atopic dermatitis.</td><td rowspan="2">Metabolized in the liver
Excretion via kidney except fexofenadine</td><td rowspan="2">ADRs: Sedation, tinnitus, fatigue, dizziness, blurred vision, dry mouth, CNS effects at overdose</td><td rowspan="2">Drugs interaction: Interact with CNS depressants & cholinesterase inhibitors</td></tr>
<tr><td>2nd</td><td>Cetirizine
Loratadine</td><td rowspan="2">short duration, no drug interaction, minimal ADRs, specific for H1 receptors</td></tr>
<tr><td>3rd</td><td>Levocetirizine
Fexofenadine
Desoloratadine</td><td>serotonin</td><td colspan="2">appetite</td></tr>
<tr><td colspan="3"></td><td colspan="3">α-adrenergic</td><td colspan="2">Hypotension
Dizziness
Reflex tachycardia</td></tr>
<tr><td colspan="3"></td><td colspan="3">cholinergic</td><td colspan="2">Dry mouth
Urinary retention
Sinus tachycardia</td></tr>
<tr><td colspan="2"></td><td></td><td colspan="3">Clinical use</td><td colspan="3">ADRs</td></tr>
<tr><td colspan="2" rowspan="2">ANTI-ALLERGICS</td><td>Mast cell stabilizers:
Cromolyn &
Nedocromyl</td><td colspan="3">Used in children for prophylaxis of perennial allergic rhinitis.
*Should be given on a daily basis and never stop abruptly.</td><td colspan="3">Induce cough, wheezes, headache, rash</td></tr>
<tr><td>Leukotriene receptor Antagonists :
Zafirlukast,
Montelukast,
Pranlukast</td><td colspan="3">Prophylaxis of lower respiratory tract allergies</td><td colspan="3">Elevation of liver enzymes, headache, dyspepsia</td></tr>
<tr><td colspan="2">topical Corticosteroids</td><td>beclomethasone,
budesonide, &
fluticasone</td><td colspan="3">Given in severe intermittent or moderate persistent symptoms</td><td colspan="3">Nasal irritation, fungal infection, hoarseness of voice</td></tr>
<tr><td colspan="2" rowspan="2">Decongestants (α-Adrenergic agonists)</td><td>Systemic:
Pseudoephedrine</td><td colspan="3" rowspan="2">For treatment of nasal stuffiness</td><td colspan="3">• Nervousness, insomnia, tremors, palpitations, hypertension.
• Better avoided in hypertension, heart failure, angina pectoris, hyperthyroidism, Glaucoma.</td></tr>
<tr><td>Topical:
Phenylethylamines & Imidazoline</td><td colspan="3">Rebound nasal stuffiness
Due to repeated administration (10 days -2 weeks)</td></tr>
<tr><td colspan="2">Anticholinergics</td><td>Ipratropium</td><td colspan="3">Nasal drops to control rhinorrhea.
-very effective in vasomotor rhinitis (watery hyper-secretion).
-bronchodilator in asthma.</td><td colspan="3">wheezing, bladder pain, cough producing mucous</td></tr>
</table>

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 of Airway 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 reaction CNS 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: Nausea Vomiting Dizziness Rash Pruritus OVERDOSE: Opoiat-like ADRs on RT &GIT + Hallucination

Probably Won't be in the exam