

Autacoid Drugs

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Histamine and Antagonists				
Recommended Curriculum Equivalent: 1.5 hr				
Drug Classes and Drugs to consider				
Endogenous Substances	H ₁ Receptor Antagonists		H ₂ Receptor Antagonists	Histamine Release Modifiers
	First Generation	Second Generation		
Histamine	DIMENHYDRINATE DIPHENHYDRAMINE PROMETHAZINE Chlorpheniramine Hydroxyzine	FEXOFENADINE LORATADINE Cetirizine	CIMETIDINE FAMOTIDINE RANITIDINE Nizatidine	CROMOLYN Omalizumab
Learning Objectives				
<p>Physiology and pathophysiology Describe the synthesis, storage and release of histamine. Describe the metabolism and elimination of histamine. Identify the major classes of histamine receptors - H₁, H₂ (with mention of H₃ and H₄) and discuss their tissue distribution and function</p>				
<p>Mechanism of action Explain the molecular mechanism of action of each drug in each drug class.</p>				
<p>Actions on organ systems Describe the pharmacological effects of the drugs in each class on various organ systems. Differentiate the histamine receptor subtypes responsible for mediating the effects of histamine in each organ system</p>				
<p>Pharmacokinetics Describe the pharmacokinetics of the second generation antihistamines.</p>				
<p>Adverse effects, drug interactions and contraindications Describe the principal adverse effects of the drugs in each class Describe the clinically important drug interactions of the drugs in each class Describe the principal contraindications of the drugs in each class</p>				
<p>Therapeutic uses Differentiate the use of the antihistamines in allergies, sedation, and motion sickness</p>				

Notes

Objectives for H₂-receptor antagonists are covered in Gastrointestinal Drugs

Objectives for Histamine Release Modifiers are covered in Asthma Drugs

5-Hydroxytryptamine (5-HT, Serotonin): Agonists & Antagonists				
Recommended Curriculum Equivalent: 0.5 hr				
Drug Classes and Drugs to consider				
Serotonin Agonists and Antagonists	Drugs used for Migraine			Antiemetic
	Abortive Agents		Prophylactic Agents	
	Triptans	Ergot Alkaloids		
SEROTONIN Cyproheptadine	SUMATRIPTAN Zolmitriptan	Ergotamine	METHYSERGIDE Amitriptyline Propranolol Topiramate	ONDANSETRON
Learning Objectives				
<p>Physiology and pathophysiology Describe the synthesis, storage and release of serotonin. Describe the metabolism and elimination of serotonin. Identify the major types of serotonin receptors relevant to therapeutic drugs acting in the brain, the vasculature and the g.i. tract. Describe the roles of serotonin in migraine, carcinoid syndrome, and in the CNS (emesis; mood disorders and other psychiatric conditions, covered with CNS drugs)</p>				
<p>Mechanism of action Explain the molecular mechanism of action of each drug in each drug class.</p>				
<p>Actions on organ systems Describe the pharmacological effects of the drugs in each class on various organ systems.</p>				
<p>Pharmacokinetics Describe the pharmacokinetics of abortive therapy for migraine.</p>				
<p>Adverse effects, drug interactions and contraindications Describe the principal adverse effects of the drugs in each class Describe the clinically important drug interactions of the drugs in each class Describe the principal contraindications of the drugs in each class</p>				
<p>Therapeutic uses Differentiate the use of these drugs in migraine (prophylaxis vs. abortive therapy) and as antiemetic agents. Note the use of the 5HT_{2A} and H₁ antagonist cyproheptadine in carcinoid syndrome.</p>				

Nitric Oxide and Drugs for Erectile Dysfunction

Recommended Curriculum Equivalent: 0.5 hr

Drug Classes and Drugs to consider

Agonist	PDE inhibitor	NO Donors	PGE ₁ Analog
NITRIC OXIDE	SILDENAFIL	SODIUM NITROPRUSSIDE Nitroglycerin	Alprostadil

Learning Objectives

Physiological roles of NO and cGMP

Describe the mechanisms and cellular site of endogenous synthesis of NO and its interactions with guanylate cyclase to regulate cellular levels of cGMP.

Explain the roles of NO and cGMP in local control of blood flow, erectile dysfunction and relaxation of the pulmonary vasculature

Mechanism of action

Explain the molecular mechanism of action of NO, guanyl cyclase and each drug in each class.

Actions on organ systems

Describe the pharmacological effects of the drugs in each class on various organ systems.

Pharmacokinetics

Describe the synthesis (constitutive vs. inducible) and release of nitric oxide.

Adverse effects, drug interactions and contraindications

Describe the principal adverse effects of the drugs in each class

Describe the clinically important drug interactions of the drugs in each class

Describe the principal contraindications of the drugs in each class

Therapeutic uses

Differentiate the use of these drugs in erectile dysfunction.

Describe the use of NO gas to induce pulmonary vasodilation in persistent pulmonary hypertension in newborn and in adult respiratory distress syndrome.

Notes

Objectives for NO donors are covered under Cardiac Drugs

Objectives for drugs related to prostaglandins in ED are covered under Eicosanoids

Eicosanoids: Agonists & Antagonists			
Recommended Curriculum Equivalent: 0.5 hr			
Drug Classes and Drugs to consider			
Prostanoids		Leukotrienes	
Endogenous	Analogs	Endogenous	Leukotriene Modifiers
PGE ₂ PGF _{2α} PROSTACYCLIN THROMBOXANE A ₂	ALPROSTADIL MISOPROSTOL Latanoprost	LTB ₄ LTC ₄ ,D ₄ ,E ₄	ZAFIRLUKAST Montelukast Zileuton
Learning Objectives			
<p>Physiology and Pathophysiology Describe the synthesis of prostaglandins, thromboxanes, leukotrienes from arachidonic acid. Describe the metabolism and elimination of eicosanoids. Explain physiologic and pathophysiologic roles of esicosanoids in regulation of local blood flow, airway resistance, inflammation and nociception</p>			
<p>Mechanism of action Explain the molecular mechanism of action of each drug in each drug class.</p>			
<p>Actions on organ systems Describe the pharmacological effects of the drugs in each class on various organ systems. Differentiate drugs inhibiting leukotriene synthesis (zileuton) from leukotriene action at CysLT₁ receptors (zafirlukast)</p>			
<p>Pharmacokinetics</p>			
<p>Adverse effects, drug interactions and contraindications Describe the principal adverse effects of the drugs in each class Describe the clinically important drug interactions of the drugs in each class Describe the principal contraindications of the drugs in each class Describe the shunting of arachidonic acid metabolism to the production of leukotrienes by inhibition of COX enzymes, leading to bronchoconstriction</p>			
<p>Therapeutic uses Describe the clinical utility of prostaglandin analogs.</p>			
<p>Notes Objectives for the Leukotriene Modifiers are covered under Asthma Drugs</p>			

Bioactive Peptides		
Recommended Curriculum Equivalent: 0.25 hr		
Drug Classes and Drugs to consider		
Kinins	Neuropeptides	
	Endogenous	Antagonist
BRADYKININ	CGRP Substance P VIP	Aprepitant
<p>Physiology and Pathophysiology: Describe the synthesis and metabolism of kinins, and the pathological factors that can trigger kinin formation. Describe the roles of substance P, neurokinins and CGRP in pain perception and local inflammation, and the probable role of substance P in emesis. Describe briefly the receptors activated by bradykinin, and substance P and other neurokinins</p>		
<p>Therapeutic uses: Describe the use of the neurokinin antagonist, aprepitant, as an anti-emetic</p>		
<p>Drug interactions Describe the effects of ACE inhibitors on the metabolism of bradykinin and the production of cough related to ACE inhibitor therapy.</p>		

Drugs used for treating Asthma and COPD

Recommended Curriculum Equivalent: 1 hr

Drug Classes and Drugs to consider

Antiinflammatory Drugs		Leukotriene Modifiers		Bronchodilators		
Steroids	Modulators of mast cell degranulation	Leukotriene receptor antagonists	5-LO inhibitor	β_2 Agonists	Methylxanthines	Muscarinic receptor antagonists
BECLOMETHASONE FLUTICASONE	CROMOLYN Omalizumab	ZAFIRLUKAST Montelukast	Zileuton	ALBUTEROL PIRBUTEROL SALMETEROL Terbutaline	THEOPHYLLINE Aminophylline	IPRATROPIUM Tiotropium

Learning Objectives

Physiology and Pathophysiology

Describe the disease processes of asthma and COPD including airway inflammation, bronchial smooth muscle constriction, and mast cell degranulation

Describe the role of various mediators (histamine, acetylcholine, proteases, leukotrienes C4, D4; prostaglandins; cytokines) in asthma and COPD

Mechanisms of action

Explain the molecular mechanism of action of each drug in each drug class.

Actions on organ systems

Differentiate the effects on the lung of the quick relief drugs and the drugs used for long term control.

Pharmacokinetics

Describe the routes of administration of each drug.

List the main drugs and clinical situations that can alter the pharmacokinetics of theophylline.

Adverse effects, drug interactions and contraindications

Describe the principal adverse effects of the drugs of each class.

Describe the clinically important drug interactions of the drugs of each class

Describe the principal contraindications of the drugs of each class

Therapeutic uses

Differentiate the use of these drugs in asthma (short term relief and long term control) and their use in COPD.

Notes

Objectives for steroids are covered under Adrenal Cortex

Hypersensitivity and Immunopharmacology

Recommended Curriculum Equivalent: 1 hr

Drug Classes and Drugs to consider

Immunosuppressants					Immunostimulants and colony stimulating factors
Cytotoxic drugs	Lymphotoxic drugs	Drugs acting on Immunocompetent cells	Drugs acting on cytokines or on cytokine receptors	Other	
AZATHIOPRINE	PREDNISONE Antithymocyte immunoglobulin	CYCLOSPORINE TACROLIMUS MYCOPHENOLATE MOFETIL Muromonab Sirolimus	DACLIZUMAB INFLIXIMAB Lenalidomide Etanercept Thalidomide	Rh ₀ (D) immune globulin	EPOETIN ALFA FILGRASTIM (G-CSF) INTERFERONS SARGRAMOSTIM (GM-CSF) Aldesleukin BCG vaccine

Learning Objectives

Physiology and Pathophysiology

Describe the role of immunoglobulins (IgE, IgG, IgM) and cytokines in the immune response
Differentiate different types of allergic reactions (Type I-IV) and factors (e.g. cytokines, MHC) involved
Describe the release of allergic mediators and processes leading to hypersensitivity

Mechanisms of action

Explain the molecular mechanism of action of each drug in each drug class.

Actions on organ systems

Relate the main effects of each drug to its molecular mechanism of action.

Pharmacokinetics

Describe the route of administration and the relevant pharmacokinetic features of each drug in each drug class

Adverse effects, drug interactions and contraindications

Describe the principal adverse effects of the drugs of each class.
Describe the clinically important drug interactions of the drugs of each class
Describe the principal contraindications of the drugs of each class

Therapeutic uses

Outline the main therapeutic uses of the drugs of each class

Notes

Objectives for Corticosteroids are covered under Adrenal Cortex

Analgesic, Antipyretic, Antiinflammatory				
Recommended Curriculum Equivalent: 1 hr				
Drug Classes and Drugs to consider				
Analgesic, Antipyretic Drugs	Nonsteroidal Antiinflammatory Drugs (NSAIDS)			Antidote for acetaminophen
	Salicylic acid derivatives	Nonselective COX inhibitors	Selective COX-2 inhibitors	
ACETAMINOPHEN	ACETYLSALICYLIC ACID Mesalamine Sodium salicylate	IBUPROFEN INDOMETHACIN NAPROXEN Diclofenac Ketorolac Piroxicam	Celecoxib	Acetylcysteine
Learning Objectives				
<p>Physiology and Pathophysiology of pain, inflammation & hyperthermia Outline the physiological basis of temperature control and peripheral sensory pain fibers Describe the role of eicosanoids and bradykinin in causing local pain, edema and fever. Outline the pathophysiology of acute and chronic inflammation</p>				
<p>Mechanisms of action Explain the molecular mechanism of action of each drug in each drug class. Differentiate the mechanisms of action of acetylsalicylic acid, acetaminophen, and NSAIDS</p>				
<p>Actions on organ systems Differentiate the effects on pain, fever, and inflammation of the drugs in each class.</p>				
<p>Pharmacokinetics Describe the metabolism of and mechanism of toxicity of acetaminophen Describe the factors that affect the renal elimination of acetylsalicylic acid</p>				
<p>Adverse effects, drug interactions and contraindications Describe the principal adverse effects of the drugs of each class. Describe consequences of protein binding, zero order metabolism, and irreversible inhibition related to acetylsalicylic acid Describe the clinically important drug interactions of the drugs of each class Describe the principal contraindications of the drugs of each class</p>				
<p>Therapeutic uses Differentiate the use of these drugs in treatment of pain, fever, and inflammation. Describe the principles of treatment for acetaminophen toxicity Describe the principles of treatment for salicylate toxicity</p>				
<p>Notes: Objectives for glucocorticoids are covered under Adrenal Cortex Objectives for opiates are covered under CNS</p>				

Disease Modifying Antirheumatic Drugs (DMARDS)			
Recommended Curriculum Equivalent: 0.5 hr			
Drug Classes and Drugs to consider			
COX Inhibitors	DMARDS		
	Immunosuppressant Drugs	Antimalarial	Gold Compounds
ASPIRIN IBUPROFEN NAPROXEN Celecoxib	ANAKINRA ETANERCEPT INFLIXIMAB METHOTREXATE Leflunomide Sulfasalazine	Hydroxychloroquine	Auranofin Gold sodium thiomalate
Learning Objectives			
Mechanism of action Explain the molecular mechanism of action common to all nonsteroidal antiinflammatory drugs (NSAIDs) Describe the likely mechanisms of antirheumatic action of the DMARDS.			
Pharmacokinetics List the routes of administration of drugs in each class Recognize the time required before the onset of action of the DMARDS			
Adverse effects, drug interactions and contraindications Describe the main adverse effects of the drugs of each class. Describe the clinically important drug interactions of the drugs of each class. Describe the principal contraindications or precautions of the drugs of each class.			
Therapeutic uses Outline the use of the NSAIDS and DMARDS in arthritic disorders.			
Notes Objectives for COX inhibitors are covered under Analgesic, Antipyretic, Antiinflammatory Drugs			

Gout		
Recommended Curriculum Equivalent: 0.5 hr		
Drug Classes and Drugs to consider		
Drugs for the gouty attack	Decrease urate formation	Increase urate excretion
Colchicine INDOMETHACIN	ALLOPURINOL Febuxostat Rasburicase	PROBENECID Sulfapyryrazone
Learning Objectives		
Physiology and Pathophysiology Describe the causes and pathophysiology of acute gouty arthritis and chronic tophaceous gout		
Mechanisms of action Explain the molecular mechanism of action of each drug in each drug class.		
Actions on organ systems Describe the pharmacological effects of each drug in each class. Differentiate the effects of the drugs in the treatment of gout		
Pharmacokinetics		
Adverse effects, drug interactions and contraindications Describe the principal adverse effects of the drugs of each class. Describe the clinically important drug interactions of the drugs of each class Describe the principal contraindications of the drugs of each class List the drugs that interfere with the renal excretion of uric acid Describe the mechanism of gouty flare-up associated with the treatment of chronic tophaceous gout		
Therapeutic uses Differentiate the use of these drugs in the treatment of acute gout attacks and as prophylactic therapies		
Notes Rasburicase is used in pediatric patients receiving cancer chemotherapy		